Improving Diabetes Care Among Patients Overdue for Recommended Testing: A Randomized Controlled Trial of Automated Telephone Outreach

STEVEN R. SIMON, MD, MPH[1]
CONNIE MAH TRINACTY, PHD[1]
STEPHEN B. SOUMERAI, SCD[1]
JOHN D. PIETTE, PHD[2]
JAMES B. MEIGS, MD, MPH[3]
PING SHI, MA[1]
ARTHUR ENSROTH, MPH[4]
DENNIS ROSS-DEGNAN, SCD[1]

OBJECTIVE — The study's objective was to assess the effects of automated telephone outreach with speech recognition (ATO-SR) on diabetes-related testing.

RESEARCH DESIGN AND METHODS — We identified 1,200 health plan members who were overdue for diabetes-related testing and randomly allocated 600 to ATO-SR and 600 to usual care (no intervention). The intervention included three interactive calls encouraging recommended testing. The primary outcome was retinopathy testing, since this was the health plan's principal goal. Tests for glycemia, hyperlipidemia, and nephropathy were secondary outcomes.

RESULTS — In total, 232 participants (39%) verbally responded to the calls. There was no difference between the intervention and the usual care groups in the primary outcome (adjusted hazard ratio 0.93 [95% CI 0.71–1.22]) and no effect of the intervention on any of the secondary outcomes.

CONCLUSIONS — Fewer than 40% of the patients randomized to ATO-SR interacted verbally with the system. The intervention had no effect on the study's outcomes.

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Widely accepted guidelines define effective strategies for the care of patients with diabetes (1). However, many patients with diabetes do not undergo recommended testing (2–5). Two published randomized controlled trials found that automated telephone programs using live nurse follow-up improved diabetes outcomes (6,7). The objective of this study was to assess the effects of automated telephone outreach with speech recognition (ATO-SR) on rates of testing for retinopathy, glycemia, hyperlipidemia, and nephropathy in a diverse population of privately insured patients with diabetes.

RESEARCH DESIGN AND METHODS

— This randomized controlled trial was conducted at Harvard Pilgrim Health Care, a not-for-profit health plan. A flow diagram of study participation is shown in supplementary Figure 1 (available in an online appendix at http://care.diabetesjournals.org/cgi/content/full/dc09-2332/DC1). In 2006, we identified all 35,065 adult health plan members with diabetes, 95% of whom had type 2 diabetes. We limited the sample to individuals with no insurance claim for a dilated eye examination in the prior year and no claim for one or more of the following tests: A1C, LDL cholesterol, or microalbumin. From 5,140 eligible patients, we randomly selected 1,200 individuals and randomly allocated them to the intervention (n = 600) and usual care (n = 600) groups.

We mailed a letter to all 600 patients in the intervention group, informing them that they would receive a series of automated calls from Harvard Pilgrim to support their diabetes care. We developed the intervention based on prior studies (6–8). In particular, we conducted a series of interviews with Harvard Pilgrim patients and physicians to characterize their willingness to interact with ATO-SR and identified topics of interest (8). The computerized system placed three calls to the participants' home telephone numbers, encouraging the participants to fulfill recommended testing if it had not been performed in the preceding year. A summary of the call content is shown in supplementary Table 1. The computerized system used speech recognition to respond to participants with segments of recorded text spoken with a human voice. The automated system offered a live telephone call back to assist in scheduling tests and also offered to send participants the following items: *1*) a voucher that would allow the provider to waive the co-payment for a dilated eye examination; *2*) an educational nutrition video; *3*) a cookbook; or *4*) a pill box. For each of the three intervention calls, the automated telephone system made up to six attempts to reach the patient, leaving up to two messages requesting a call back.

We used health plan membership and claims records for all analyses. The primary outcome measure was the completion of a dilated eye examination among individuals without evidence of examination in the preceding year. Secondary outcome measures were the completion of A1C, LDL cholesterol, and microalbumin testing.

From the [1]Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, Massachusetts; the [2]Ann Arbor VA Medical Center and the Division of General Internal Medicine, University of Michigan, Ann Arbor, Michigan; the [3]Division of General Medicine, Massachusetts General Hospital, Boston, Massachusetts; and the [4]Clinical Programs and Quality Measurement, Harvard Pilgrim Health Care, Wellesley, Massachusetts.
Corresponding author: Steven R. Simon, steven_simon@hphc.org.
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Statistical analyses

The main analyses included all subjects in the groups to which they were randomized. We used the Kaplan-Meier method and log-rank test to assess the differences between the intervention and usual care groups in the time to the receipt of recommended testing and segmented proportional hazards regression to account for baseline differences in measured variables and for differential completion of testing prior to the intervention.

RESULTS — Compared with the usual care group, the intervention group was younger (50 vs. 52 years, $P = 0.02$) and had a greater proportion of men (64 vs. 41%, $P = 0.04$); the groups were comparable on other socio-demographic measures and clinical indicators as shown in supplementary Table 2. A total of 232 participants (39%) verbally responded to the calls. The factors associated with call participation are shown in supplementary Table 3.

In the primary analysis, there was no difference in the time to the completion of a dilated eye examination and no difference in the time to the completion of A1C and microalbumin tests; the intervention group had a shorter time to LDL cholesterol testing ($P = 0.045$ by the log-rank test). The Kaplan-Meier curves are shown in supplementary Fig. 2. In multivariate analyses, there was no difference between the intervention and usual care groups in the time to a dilated eye examination (adjusted hazard ratio [HR] 0.93 [95% CI 0.71–1.22]) and no effect on times to the secondary outcomes of A1C testing (0.72 [0.38–1.37]), LDL cholesterol testing (1.31 [0.56–3.05]), and microalbumin testing (1.14 [0.69–1.89]).

CONCLUSIONS — In this randomized controlled trial, only 39% of health plan members randomized to the automated telephone outreach interacted verbally with the system. The intervention had no effect on the study's outcomes.

Previous studies have shown modest effects of automated telephone outreach interventions to improve diabetes care, although those interventions capitalized on the involvement of a nurse or a diabetes educator (6,7). To enhance the participants' engagement, this study included token gifts, which could reasonably be included in a real-world intervention program, but these gifts appeared to have no effect on the outcome. The intervention appeared to fail in part because a majority of targeted patients did not meaningfully interact with the system.

The study has several limitations. First, the intervention was designed to rely on automated systems rather than human interactions. Targeted outreach by clinicians may have yielded higher participation rates. Second, the high overall rates of recommended testing in our health plan population and the study's focus on members who had not completed testing in the prior year may have limited effectiveness. This intervention might have larger effects in other populations with lower baseline testing rates. Third, although we compared ATO-SR with usual care, comparing this approach with a telephone intervention using human callers would also be useful. Fourth, some patients may have been told by their doctors that they do not need to obtain an annual eye exam. Because this was a randomized trial, these patients were likely distributed with similar frequency in both study groups, making confounding unlikely.

Automated telephone outreach may be a valuable adjunct to programs for improving diabetes care in large populations. As with any technological intervention, refinement of this approach may enhance its effectiveness; this "negative" study does not rule out the potential for future success. To be effective, these interventions need to incorporate methods for ensuring greater participation, possibly through a partnership with clinicians. Further research is also needed to understand the characteristics of patients who may resist this type of intervention in order to develop alternative approaches that might be more effective.

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